

ELK MOUNTAIN FARMS BACKWOODS (PWSNO 1110040) SOURCE WATER ASSESSMENT REPORT

March 4, 2003



State of Idaho Department of Environmental Quality

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Executive Summary

Under the Safe Drinking Water Act Amendments of 1996, all states are required by the U.S. Environmental Protection Agency to assess every source of public drinking water for its relative sensitivity to contaminants regulated by the act. This risk assessment is based on a land use inventory in the well recharge zone, sensitivity factors associated with how the well was constructed, and aquifer characteristics.

This report, *Source Water Assessment for Elk Mountain Farms Backwoods*, describes the public drinking water source; the recharge zone and potential contaminant sites located inside the recharge zone boundaries. Taken into account with local knowledge and concerns, it should be used as a planning tool to develop and implement appropriate protection measures for this public water system. **The results should not be used as an absolute measure of risk and they should not be used to undermine public confidence in the water system.**

Elk Mountain Farms Backwoods operates a non-community non-transient water system serving 5 year round and 200 seasonal users in rural Boundary County Idaho (Figure 1). A 380-foot deep well supplies drinking water to two processing plants, offices, a residence and a 60 unit migrant worker housing facility located on West Side Road between Bonners Ferry and Porthill.

The well ranked moderately susceptible to all classes of regulated contaminants in a susceptibility analysis conducted by the Idaho Department of Environmental Quality on February 4, 2003. Risks associated with the local geology added the most points to the final susceptibility scores. Other than the Backwoods facilities and a county road crossing the 0-3 year time of travel zone, no potential contaminant sites are documented inside the well recharge zone.

This assessment should be used as a basis for determining appropriate new protection measures or re-evaluating existing protection efforts. No matter what ranking a source receives, protection is always important. Whether the source is currently located in a “pristine” area or an area with numerous industrial and/or agricultural land uses that require education and surveillance, the way to ensure good water quality in the future is to act now to protect valuable water supply resources.

Because it operates and maintains the water system in compliance with the *Idaho Rules for Public Drinking Water Systems* Elk Mountain Farms Backwoods already has some significant drinking water protection measures in place. Protection efforts should focus on managing farm facilities over the recharge zone to prevent ground water contamination from residential and agricultural land use.

SOURCE WATER ASSESSMENT FOR ELK MOUNTAIN FARMS BACKWOODS

Section 1. Introduction - Basis for Assessment

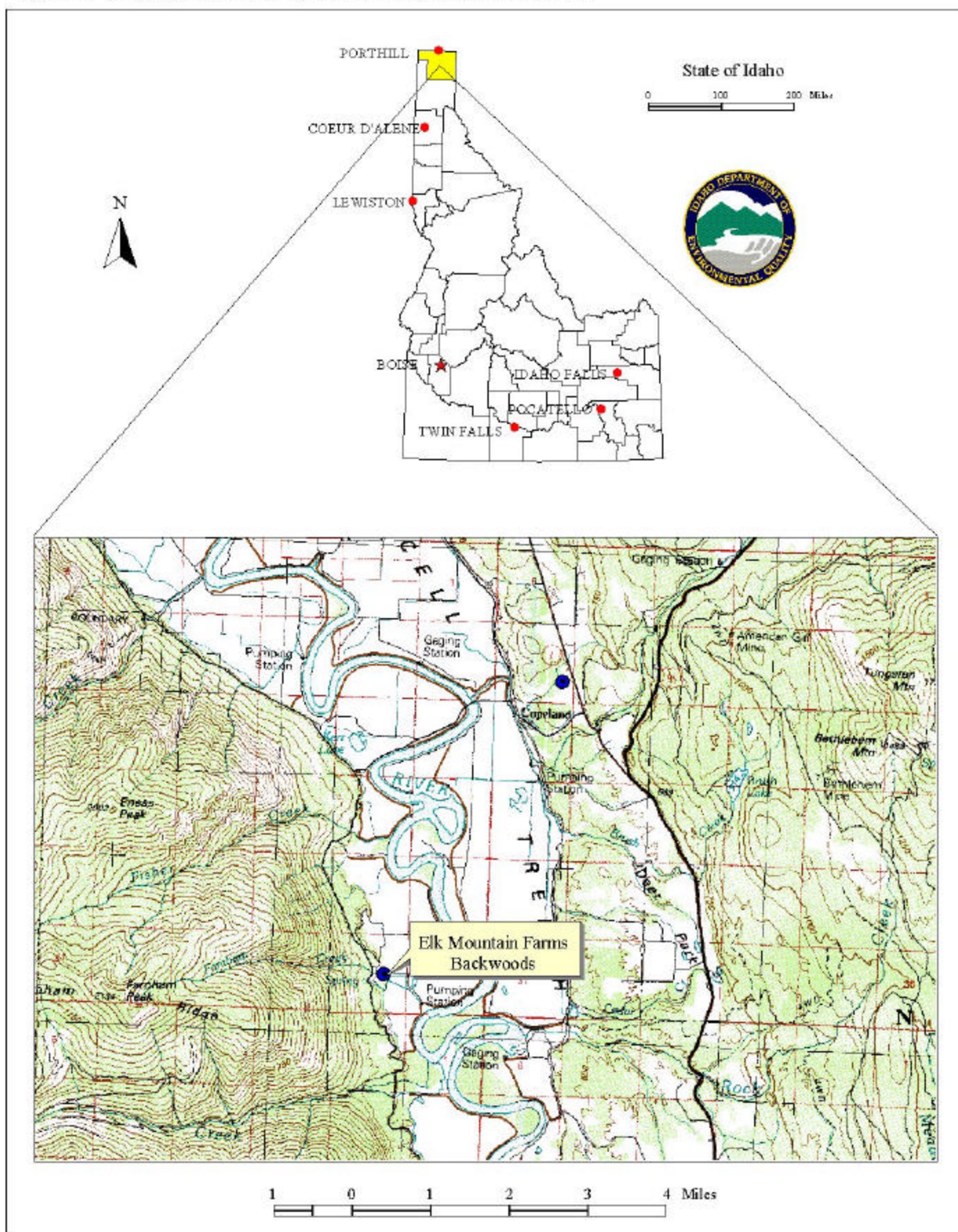
The following sections contain information necessary for understanding how and why this assessment was conducted. **It is important to review this information to understand what the ranking of this source means.** Maps showing the delineated source water assessment area and an inventory of significant potential sources of contamination identified within that area are included. The water Susceptibility Analysis Worksheets used to develop this assessment is attached.

Level of Accuracy and Purpose of the Assessment

The Idaho Department of Environmental Quality (DEQ) is required by the U.S. Environmental Protection Agency (EPA) to assess every public drinking water source in Idaho for its relative susceptibility to contaminants regulated by the Safe Drinking Water Act. These assessments are based on a land use inventory inside the delineated recharge zones, sensitivity factors associated with how the well is constructed, and aquifer characteristics. The state must complete more than 2900 assessments by May of 2003. Because resources and the time available to accomplish assessments are limited, an in-depth, site-specific investigation for every public water system is not possible.

The results of the source water assessment should not be used as an absolute measure of risk and they should not be used to undermine public confidence in the water system. The ultimate goal of this assessment is to provide data to local communities for developing a protection strategy for their drinking water supply. The Idaho Department of Environmental Quality recognizes that pollution prevention activities generally require less time and money to implement than treating a public water supply system once it has been contaminated. DEQ encourages communities to balance resource protection with economic growth and development. The decision as to the amount and types of information necessary to develop a source water protection program should be determined by the local community based on its own needs and limitations. Wellhead or source water protection is one facet of a comprehensive growth plan, and it can complement ongoing local planning efforts.

Figure 1. Geographic Location of Elk Mountain Farms Backwoods



Section 2. Preparing for the Assessment

Defining the Zones of Contribution - Delineation

The delineation process establishes the physical area around a well or surface water intake that will become the focal point of the assessment and protection efforts. For wells, the process includes mapping the boundaries of the well recharge area into time of travel (TOT) zones indicating the number of years necessary for a particle of water flowing through the aquifer to reach a well. DEQ assimilated data from a variety of sources, including local well logs to model ground water flow.

The only well log available for the Elk Mountain Farms Backwoods area is for the source well itself. The well log indicates a 380 foot deep well, cased to 208 feet, with an open hole completion in shale and granite and a static water level 10 feet below ground surface. The pumping volume (6417 ft³/day) was estimated from a population served of 200 and a multiplier of 1.5. Based on the well log the saturated thickness of the aquifer can be interpreted to be between 170 and 370 feet. A gradient of 0.1 was estimated based on the steep nature of the topography immediately upgradient to the west. Hydraulic conductivity, estimated from the pumping test of the source well, ranges from 0.2 to 1.7 feet/day, depending on which estimate of saturated thickness is used.

Based on these assumptions a uniform flow method was used to generate the time of travel zones for the Elk Mountain Farms Backwoods well. The lengths of the 3, 6 and 10 year TOT (using the conductivity value of 1.7 feet/day) were estimated to be 1900, 3800, and 6300 feet, respectively. The width was estimated at 788 feet. The time of travel zones were then rotated to account for uncertainty in the direction of ground water flow. The resulting delineation, shown in Figure 2, is generally oriented in a west to east direction with the assumption being the ground water system is moving from the uplands toward the Kootenai River as a discharge location. If a lower aquifer gradient or a lower hydraulic conductivity is assumed the size of the resultant TOT would be reduced.

Identifying Potential Sources of Contamination

The goal of the inventory process is to locate and describe those facilities, land uses, and environmental conditions that are potential sources of water contamination. Inventories for all public water systems in Idaho were conducted in two-phases. The first phase involved identifying and documenting potential contaminant sources within a system's source water assessment area through the use of computer databases and Geographic Information System maps developed by DEQ. Maps showing the delineations and tables summarizing the results of the database search were then sent to system operators for review and correction during the second or enhanced phase of the inventory process.

Many potential sources of contamination are regulated at the federal level, state level, or both to reduce the risk of release. When a business, facility, or property is identified as a potential contaminant source, this should not be interpreted to mean that this business, facility, or property is in violation of any local, state, or federal environmental law or regulation. What it does mean is that the potential for contamination exists due to the nature of the business, industry, or operation.

Section 3. Susceptibility Analysis

The susceptibility to contamination of all water sources in Idaho is being assessed on the following factors:

- physical integrity of the well or surface water intake,
- hydrologic characteristics of ground water sources,
- land use characteristics, and potentially significant contaminant sources
- historic water quality

The susceptibility rankings are specific to a particular potential contaminant or category of contaminants. A high susceptibility rating relative to one potential contaminant does not mean that the water system is at the same risk for all other potential contaminants. The relative ranking that is derived for each well is a qualitative, screening-level step that, in many cases, uses generalized assumptions and best professional judgement. The following summaries describe the rationale for the susceptibility ranking. The susceptibility analysis worksheets for the Elk Mountain Farms Backwoods springs and well in Attachment A show in detail how the sources were scored.

System Construction

Construction factors directly affect the ability of a well to protect the aquifer from contaminants. Lower scores imply a well that can better protect the water. This portion of the susceptibility analysis relies on information from individual well logs and from the most recent sanitary survey of the public water system. When the Elk Mountain Farms Backwoods well was inspected in 2002 only minor deficiencies in wellhead and surface seal maintenance were noted. A conduit at the wellhead needed to be repaired, and there was a depressed area around the casing that needed to be filled in and graded for proper drainage.

The well was drilled in 1987 to a depth of 380 feet, and sealed with bentonite to a depth of 20 feet. The well casing, 8-inch diameter steel with a 0.250-inch wall thickness, extends from 18 inches above ground to a depth of 208 feet. The casing terminates 8 feet below the interface between unconsolidated sand and silt and the underlying shale. Current Idaho Department of Water Resources well construction standards require the surface seal to extend into the rock formation above the water-bearing zone. The standards also specify a minimum wall thickness of 0.322 inches for 8-inch steel casing. Air testing at the time of drilling produced an estimated 100 gallons per minute from a granite stratum 295 to 380 feet below ground. Static water level is 10 feet below land surface.

Though the well is in the flood plain of the Kootenai River, it pumps ground water without surface water influence.

Hydrologic Sensitivity

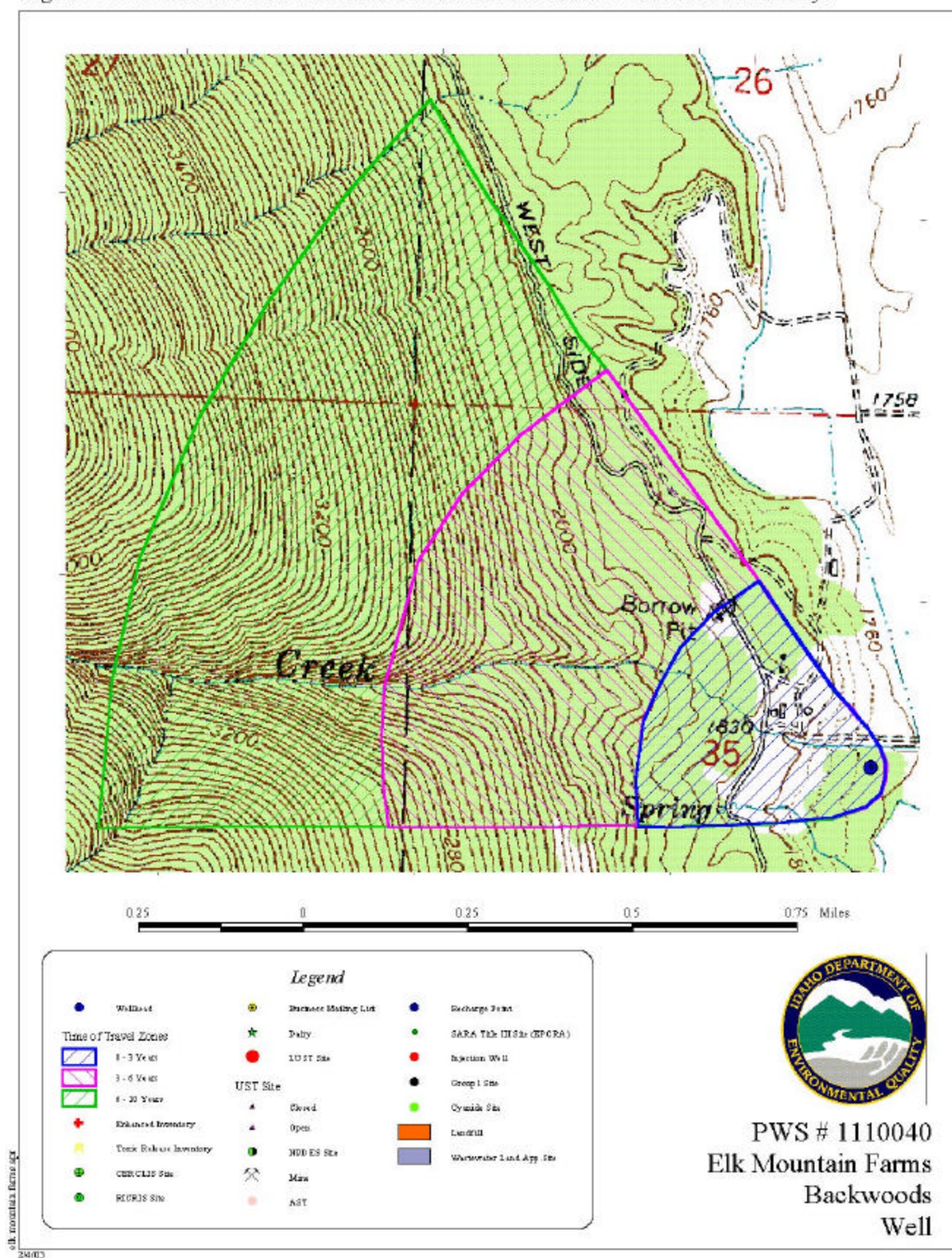
The susceptibility analyses for ground water sources includes assignment of hydrologic sensitivity scores that reflect natural geologic conditions at the well site and in the recharge zone. Information for this part of the analysis is derived from individual well logs and from the soil drainage classification inside the delineation boundaries. Elk Mountain Farms Backwoods well scored 3 points out of 6 points possible in this portion of the susceptibility analysis.

Soils in the recharge zone as a whole are classified as poorly drained to moderately well drained. Soils that drain slowly are deemed more protective of ground water than rapidly draining soils. Starting from the surface with 200 feet of sand and silt, the soil profile at the well site continues with 95 feet of shale then granite from 295 feet to the bottom of the well. Water was found in all strata.

Potential Contaminant Sources and Land Use.

The 500-acre Elk Mountain Farms Backwoods recharge zone is mostly forested. West Side Road crosses the 0-3 year time of travel zone. The well is near the entrance to the Backwoods farm facility, which includes two processing plants, offices, a residence and a 60 unit migrant worker housing complex. Irrigated cropland begins about 100 feet southwest of the well. No other potential sources of contamination are documented inside the delineation boundaries.

Figure 2. Elk Mountain Farms Backwoods Delineation and Potential Contaminant Inventory.



Historic Water Quality

Elk Mountain Farms Backwoods tests quarterly for total coliform bacteria. In the period from January 1998 through December 2002 all total coliform tests were negative. Water for the migrant housing is chlorinated before it enters the reservoir. Chemical and radiological sampling results for the well are summarized below.

Table 1. Elk Mountain Farms Backwoods Chemical Test Results

Primary IOC Contaminants (Mandatory Tests)							
Contaminant	MCL (mg/l)	Results (mg/l)	Dates	Contaminant	MCL (mg/l)	Results (mg/l)	Dates
Antimony	0.006	ND	8/11/97, 12/19/00	Nitrate	10	ND to 0.7	3/2/93 to 3/25/02
Arsenic	0.01	ND	8/11/97, 12/19/00	Nickel	N/A	ND	8/11/97, 12/19/00
Barium	2.0	0.02, 0.023	12/19/00, 8/11/97	Selenium	0.05	ND	8/11/97, 12/19/00
Beryllium	0.004	ND	8/11/97, 12/19/00	Sodium	N/A	21.5, 11	8/11/97, 12/19/00
Cadmium	0.005	ND	8/11/97, 12/19/00	Thallium	0.002	ND	8/11/97, 12/19/00
Chromium	0.1	ND, 0.009	8/11/97, 12/19/00	Cyanide	0.02	ND	12/19/00
Mercury	0.002	ND	8/11/97, 12/19/00	Fluoride	4.0	0.34, 0.2	8/11/97, 12/19/00
Secondary and Other IOC Contaminants (Optional Tests)							
Contaminant	Recommended Maximum (mg/l)		Results			Dates	
Sulfate	250		7.4, 12.0 (mg/l)			8/11/97, 12//19/00	
Zinc	5.0		0.031			12/19/00	
Iron	0.3		0.25			12/19/00	
Manganese	0.05		0.077			12/19/00	
Regulated and Unregulated Synthetic Organic Chemicals							
Contaminant			Results		Dates		
29 Regulated and 13 Unregulated Synthetic Organic Compounds			None Detected		8/11/97, 11/27/01		
Regulated and Unregulated Volatile Organic Chemicals							
Contaminant			Results		Dates		
21 Regulated And 16 Unregulated Volatile Organic Compounds			None Detected		12/18/90, 8/11/97, 11/27/01		
Radiological Contaminants Springs and Distribution system samples							
Contaminant			MCL	Results	Dates		
Gross Alpha, Including Ra & U			15 pC/l	5.4 pCi/l	6/6/89		
Gross Beta Particle Activity			50 pC/l 4 mrem/year	7.8 pCi/l	6/6/89		

Final Susceptibility Ranking

The well ranked moderately susceptible to all classes of regulated contaminants. Risk factors associated with well site geology added the most points to the final susceptibility scores. Totals for system construction and hydrologic sensitivity along with the cumulative scores for land use and potential contaminant sites are shown on Table 2. The complete susceptibility analysis worksheet for the Elk Mountain Farms Backwoods well is in Attachment A.

The final scores for ground water sources are determined using the following formulas:

- 1) VOC/SOC/IOC Final Score = Hydrologic Sensitivity + System Construction + (Potential Contaminant/Land Use x 0.2)
- 2) Microbial Final Score = Hydrologic Sensitivity + System Construction + (Potential Contaminant/Land Use x 0.35)

The final ranking categories are as follows:

- 0 - 5 Low Susceptibility
- 6 - 12 Moderate Susceptibility
- > 13 High Susceptibility

Table 2. Summary of Elk Mountain Farms Backwoods Susceptibility Evaluation

Cumulative Susceptibility Scores						
Well Name	System Construction 0-6 possible	Hydrologic Sensitivity 0-6 possible	Contaminant Inventory plus Land Use			
			IOC 0-30 possible	VOC 0-30 possible	SOC 0-30 possible	Microbial 0-14 possible
Well #1	3	3	2	2	2	2
Final Susceptibility Scores/Ranking						
Well Name	IOC 0-18 possible	VOC 0-18 possible	SOC 0-18 possible	Microbial 0-15 possible		
Well #1	6/Moderate	6/Moderate	6/Moderate	7/Moderate		

Low numbers are favorable because high scores indicate increased susceptibility to contaminants
IOC = inorganic chemical, VOC = volatile organic chemical, SOC = synthetic organic chemical

Section 4. Options for Source Water Protection

The susceptibility assessment should be used as a basis for determining appropriate new protection measures or re-evaluating existing protection efforts. No matter what the susceptibility ranking a source receives, protection is always important. Whether the source is currently located in a “pristine” area or an area with numerous industrial and/or agricultural land uses that require education and surveillance, the way to ensure good water quality in the future is to act now to protect valuable water supply resources.

Elk Mountain Farms Backwoods already has some important protections in place for its well. Except for the Backwoods farm facilities east of West Side Road, the recharge zone for the well is undeveloped forest. The well head is located on a fenced well lot. The system adheres to a maintenance schedule and is in compliance with monitoring requirements. Deficiencies noted on the last sanitary survey, loose conduit at the wellhead and a depressed area where water could pond around the well casing, were fairly minor but should be attended to before they compromise the well seal.

It is important to remember that land use, commercial and domestic activities in the 0-3 year time of travel zone are more likely to cause water quality problems than activities elsewhere in the recharge zone. Elk Mountain Farms Backwoods should investigate programs like Farm*A*Syst (<http://www.uwex.edu/farnasyst/>) that help well owners assess everyday household and agricultural activities for their potential for ground water contamination.

Elk Mountain Farms Backwoods has a written fire emergency plan. The system should consider expanding the scope of this document to encompass other situations that could threaten the water supply. There is a simple fill-in-the-blanks form available on the DEQ website to guide systems through the emergency response planning process.

Assistance

Public water suppliers and users may call the following IDEQ offices with questions about this assessment and to request assistance with developing and implementing a local protection plan. In addition, draft protection plans may be submitted to the IDEQ office for preliminary review and comments. Water systems serving fewer than 10,000 people source water protection planning help from Melinda Harper of the Idaho Rural Water Association.

Idaho Department of Environmental Quality

Coeur d'Alene Regional IDEQ Office

(208) 769-1422

State IDEQ Office, Boise

(208) 373-0502

Website:

<http://www.deq.state.id.us/>

Idaho Rural Water Association

Melinda Harper, Groundwater Protection Specialist

(800) 962-3257

Website:

<http://www.idahoruralwater.com>

Idaho Association of Soil Conservation Districts

Water quality and soil conservation

(208) 338-5900

Website:

<http://www.iascd.state.id.us/>

References Cited

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Attachment A

Elk Mountain Farms Backwoods Susceptibility Analysis Worksheet

Ground Water Susceptibility

Public Water System Name : **ELK MOUNTAIN FARMS BACKWOODS**

Source: **WELL #1**

Public Water System Number : **1110040**

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1. System Construction		SCORE			
Drill Date	9/22/87				
Driller Log Available	YES				
Sanitary Survey (if yes, indicate date of last survey)	YES	2002			
Well meets IDWR construction standards	NO	1			
Wellhead and surface seal maintained	YES	0			
Casing and annular seal extend to low permeability unit	Casing Yes, Seal No	1			
Highest production 100 feet below static water level	YES	0			
Well located outside the 100 year flood plain	NO	1			
Total System Construction Score		3			
2. Hydrologic Sensitivity					
Soils are poorly to moderately drained	YES	0			
Vadose zone composed of gravel, fractured rock or unknown	NO	0			
Depth to first water > 300 feet	NO	1			
Aquitard present with > 50 feet cumulative thickness	NO	2			
Total Hydrologic Score		3			
		IOC	VOC	SOC	Microbial
3. Potential Contaminant / Land Use - ZONE 1A (Sanitary Setback)		Score	Score	Score	Score
Predominant land use in recharge zone	WOODLAND	0	0	0	0
Farm chemical use high	NO	0	0	0	
IOC, VOC, SOC, or Microbial sources in Zone 1A	NO	NO	NO	NO	NO
Total Potential Contaminant Source/Land Use Score - Zone 1A		0	0	0	0
Potential Contaminant / Land Use - ZONE 1B (3 YR. TOT)					
Contaminant sources present (Number of Sources)	NO	0	0	0	0
(Score = # Sources X 2) 8 Points Maximum		0	0	0	0
Sources of Class II or III leacheable contaminants or Microbials	NO	0	0	0	
4 Points Maximum		0	0	0	
Zone 1B contains or intercepts a Group 1 Area	NO	0	0	0	0
Land use Zone 1B	25 to 50% Irrigated Agricultural Land	2	2	2	2
Total Potential Contaminant Source / Land Use Score - Zone 1B		2	2	2	2
Potential Contaminant / Land Use - ZONE II (6 YR. TOT)					
Contaminant Sources Present	NO	0	0	0	
Sources of Class II or III leacheable contaminants or Microbials	NO	0	0	0	
Land Use Zone II	Less than 25% Agricultural Land	0	0	0	
Potential Contaminant Source / Land Use Score - Zone II		0	0	0	0
Potential Contaminant / Land Use - ZONE III (10 YR. TOT)					
Contaminant Source Present	NO	0	0	0	
Sources of Class II or III leacheable contaminants or Microbials	NO	0	0	0	
Is there irrigated agricultural lands that occupy > 50% of Zone	NO	0	0	0	
Total Potential Contaminant Source / Land Use Score - Zone III		0	0	0	0
Cumulative Potential Contaminant / Land Use Score		2	2	2	2

4. Final Susceptibility Source Score	6	6	6	7
5. Final Well Ranking	Moderate	Moderate	Moderate	Moderate

POTENTIAL CONTAMINANT INVENTORY

LIST OF ACRONYMS AND DEFINITIONS

AST (Aboveground Storage Tanks) – Sites with aboveground storage tanks.

Business Mailing List – This list contains potential contaminant sites identified through a yellow pages database search of standard industry codes (SIC).

CERCLIS – This includes sites considered for listing under the **Comprehensive Environmental Response Compensation and Liability Act (CERCLA)**. CERCLA, more commonly known as Superfund is designed to clean up hazardous waste sites that are on the national priority list (NPL).

Cyanide Site – DEQ permitted and known historical sites/facilities using cyanide.

Dairy – Sites included in the primary contaminant source inventory represent those facilities regulated by Idaho State Department of Agriculture (ISDA) and may range from a few head to several thousand head of milking cows.

Deep Injection Well – Injection wells regulated under the Idaho Department of Water Resources generally for the disposal of stormwater runoff or agricultural field drainage.

Enhanced Inventory – Enhanced inventory locations are potential contaminant source sites added by the water system. These can include new sites not captured during the primary contaminant inventory, or corrected locations for sites not properly located during the primary contaminant inventory. Enhanced inventory sites can also include miscellaneous sites added by the Idaho Department of Environmental Quality (DEQ) during the primary contaminant inventory.

Floodplain – This is a coverage of the 100year floodplains.

Group 1 Sites – These are sites that show elevated levels of contaminants and are not within the priority one areas.

Inorganic Priority Area – Priority one areas where greater than 25% of the wells/springs show constituents higher than primary standards or other health standards.

Landfill – Areas of open and closed municipal and non-municipal landfills.

LUST (Leaking Underground Storage Tank) – Potential contaminant source sites associated with leaking underground storage tanks as regulated under RCRA.

Mines and Quarries – Mines and quarries permitted through the Idaho Department of Lands.)

Nitrate Priority Area – Area where greater than 25% of wells/springs show nitrate values above 5mg/l.

NPDES (National Pollutant Discharge Elimination System) – Sites with NPDES permits. The Clean Water Act requires that any discharge of a pollutant to waters of the United States from a point source must be authorized by an NPDES permit.

Organic Priority Areas – These are any areas where greater than 25 % of wells/springs show levels greater than 1% of the primary standard or other health standards.

Recharge Point – This includes active, proposed, and possible recharge sites on the Snake River Plain.

RICRIS – Site regulated under **Resource Conservation Recovery Act (RCRA)**. RCRA is commonly associated with the cradle to grave management approach for generation, storage, and disposal of hazardous wastes.

SARA Tier II (Superfund Amendments and Reauthorization Act Tier II Facilities) – These sites store certain types and amounts of hazardous materials and must be identified under the Community Right to Know Act.

Toxic Release Inventory (TRI) – The toxic release inventory list was developed as part of the Emergency Planning and Community Right to Know (Community Right to Know) Act passed in 1986. The Community Right to Know Act requires the reporting of any release of a chemical found on the TRI list.

UST (Underground Storage Tank) – Potential contaminant source sites associated with underground storage tanks regulated as regulated under RCRA.

Wastewater Land Applications Sites – These are areas where the land application of municipal or industrial wastewater is permitted by DEQ.

Wellheads – These are drinking water well locations regulated under the Safe Drinking Water Act. They are not treated as potential contaminant sources.

NOTE: Many of the potential contaminant sources were located using a geocoding program where mailing addresses are used to locate a facility. Field verification of potential contaminant sources is an important element of an enhanced inventory.

Where possible, a list of potential contaminant sites unable to be located with geocoding will be provided to water systems to determine if the potential contaminant sources are located within the source water assessment area.